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Octavius B. Shreve, M.D.

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FIG. 1.  
TRANSVERSE SECTION OF HEALTHY SPINAL CORD.

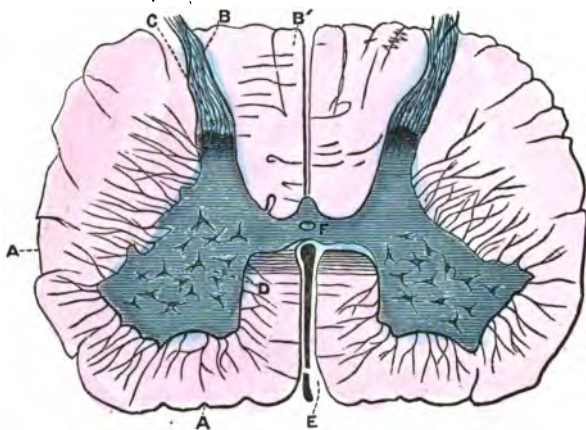
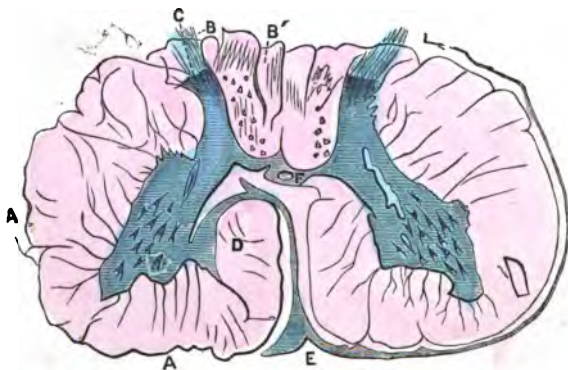


FIG. 2.  
TRANSVERSE SECTION OF DISEASED SPINAL CORD.  
(The Drawing is from a Preparation made by Dr. LOCKHART CLARKE.)  
*The letters and references same as in normal section, Fig. 1.*



IMPAIRMENT,  
OR  
LOSS OF VISION,  
FROM  
SPINAL CONCUSSION, OR SHOCK.

BY  
JABEZ HOGG,  
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AND OF THE BELGIAN MICROSCOPICAL SOCIETY, F.R.M.S., ETC.

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[*A Paper read at the Medical Society of London, Nov. 8, 1875.*]

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1876.

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# IMPAIRMENT, OR LOSS

## OF VISION

### FROM CONCUSSION OR SHOCK.

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TENDERNESS to humanity is one of the happiest characteristics of modern civilisation, and Christianity more than any other dispensation has tended to deepen the feeling in the sacredness of human life ; hence institutions have been multiplied, and means devised and adopted for the relief of every phase of suffering. At no time, however, in the history of nations, could exactitude of knowledge of disease, of diagnosis and prognosis, be more eagerly sought for or desired, than when communities are daily brought in close proximity with the severest forms of injuries arising out of our constant railway communication ; so that while our iron highways have conferred upon us considerable advantages, and have greatly facilitated intercommunication throughout the civilised world, they have likewise added to the risks and miseries of every-day life.

During a period of five years, from 1862 to 1867, and prior to Parliament making it compulsory upon railways to give a correct return of the killed and injured annually,

the average number of killed did not exceed 36 per annum. From the last-named period (1867) to the present time a progressive increase has taken place, and an average of three persons daily are now killed, and as many as eight a day are injured on the various lines of railway in this kingdom. The year 1874 will long be remembered by its disastrous casualties, the greater part of which, unhappily, arose from preventable causes. The total number of persons killed during the year on the various lines was 1,424, and of injured 5,041. Of these, 211 killed, and 1,981 injured, were passengers; of the remainder, 788 killed, and 2,815 injured, were servants of the companies or contractors; and 425 killed, and 215 injured, trespassers, or persons who met with accidents from causes over which companies have no control. The chances of being injured are, it will be seen, very great—one in every 500 are doomed to be mutilated or killed; and of the servants of the companies, one in every 350 are killed outright; while a very large number more, passengers and servants, are severely bruised, wounded, or shaken, and of whose injuries no record is kept.

The typical form of railway accident more frequently ending in spinal injury, and, *pari passu*, most destructive to human beings, is that caused by collision. It is impossible to ignore the fact that the greater number of collisions are due to causes quite within the control of railway companies. No better evidence of this can be adduced than that given at an inquest on one of the killed in the collision which occurred in September last to an excursion train on the London, Tilbury, and Southend line, when upwards of sixty persons were either injured or killed. The cruel neglect displayed was graphically described by a competent witness, who stated that no block system is

adopted, *although a part of the line is single*. The working of signals is left to chance, as no instructions whatever are issued to drivers and signalmen. Working time-tables are unknown, and therefore trains are allowed to follow each other haphazard. The line, it was stated, had been opened for twenty-one years, and no rule-books or instructions whatever were issued for the guidance of the servants until about a week ago, and therefore a signalman who ought to have been at his post to give the signal of danger at the time of the collision was engaged in the landing of cattle. Interlocking gear for points and signals are nowhere employed, and trains consisting of eighteen carriages are despatched with only one guard, the staff being too short-handed to admit of a second.

It rarely happens, on taking up a morning paper, that we do not read of a laxity of management little short of criminal neglect of the public safety. This morning (Nov. 8th, 1875) an account of a lamentable collision is reported. A passenger train dashed into a goods train near Chippenham, and scarcely a passenger escaped without cuts, bruises, or broken limbs. One gentleman is unfortunately seriously injured for the second time.

"Each new morn

New widows howl, new orphans cry, new sorrows  
Strike heaven on the face."

A succession of "so-called" accidents means, in plain language, a general incapacity to meet emergencies, and we are led to believe that railway directors think and care less of the lives of passengers than of the cost of adopting scientific appliances and means by which collisions can be prevented. In other words, managers and directors prefer taking the chance of being mulcted in

damages to putting into force good rules and taking proper precautions for the safety of their customers. Notwithstanding so palpable and trite a truism, it is usual to hear complaints of exorbitant demands for mutilated limbs and lost sight, as if mental suffering, bodily pain, broken legs, and the loss of a valuable life, frequently the bread-winner of the family, could be compensated for by any amount of railway gold. But have directors of English railways any just cause of complaint of the excessive damages awarded by juries in railway injuries? Certainly not. This has been conclusively demonstrated by M. de Franquville, who lately compared what he not inaptly calls "the butcher's bill" of France with that of England. He says: "In France in 1873, 62 persons were killed outright, and 1,191 more injured; while in England 271 were killed and 9,221 injured. In respect of damages awarded for injuries there cannot be the least ground for complaint against English juries, as the average amount awarded was 5,888 francs in England, and 20,852 francs in France." So much, then, for the reiterated statement that juries sympathise with the injured and award excessive damages.

It is quite possible to believe, however, that juries will sympathise with mutilated passengers rather than with managing directors who lack sympathy for widows and orphans of servants killed in the faithful discharge of duty. It is quite possible, also, that among the large number of persons annually maimed and lamed a few will make the most of their injuries; but it is surely not to be expected that medical men will in all cases detect impostors, for have they not to take patients' statements of subjective symptoms, of deteriorated health and strength, and inability to attend to business, and so forth? In some instances

even experts will be deceived, and then comes a conflict of opinion as to cause and effect. It is not quite so easy to simulate objective symptoms, of lost vision, of diminished muscular power, of shrunken, paralysed limbs,—any and all of which are known to be due to organic change in nerve tissue. I regard it nevertheless as a reproach to a learned profession that there should be that divergence of opinion so frequently displayed in courts of justice, particularly in inquiries on the nature and extent of railway injuries. It is positively lamentable when a member of the profession appears in the character of an advocate, volunteers statements and unasked for explanations, and in a manner acts as a partisan rather than as a scientific expert, anxious to assist in arriving at the truth and balancing the scales of justice between contending parties.

A remarkable instance of inconsistency of opinion—one constituting just grounds of animadversion on the part of jurists—occurred very recently in the case of *Wood v. The Manchester and Sheffield Railway Company*. The wretched man *Wood* was in the collision near the *Conisborough* station only two months before he died from his injuries. His medical advisers properly treated him for traumatic meningitis, and ultimately certified that this was the cause of death. On the part of the railway company it was contended by certain witnesses that he died from typhoid fever, and not from meningitis. The grounds for this supposition were that typhoid fever had prevailed to some extent near *Wood's* farm: none in his house was in any way affected, but this gave the cue. The medical witnesses examined at the trial differed, it will be seen, as to cause and effect, and oddly enough as to the post-mortem appearances of the

brain. It was, however, unmistakably shown that the symptoms on the seventeenth day after the injury were not those of typhoid fever, and the gentleman who made the post-mortem asserted that the arachnoid membrane was "rough, covered with lymph, milky white or semi-opaque;" in short, was conclusive. The plea, then, for the defence was very like an after thought, or an ingenious device to confound the jury, and mitigate the damages, in one of the clearest cases of injury of the spine on record. There was indeed but one omission in the means employed to obtain a perfect diagnosis of the case, and that was the ophthalmoscopic appearances of the internal eye. But an ophthalmoscopic examination might not have assisted the case, as in the severer forms of spinal injury evidences of eye disease are not unfrequently wanting. In calmly reviewing this and similar instances of disagreement between medical witnesses, all will agree with Mr. Le Gros Clark, "that the public regard this antagonistic action in its moral rather than its scientific aspect, and in a way not very complimentary to the profession."

With these few general observations I must dismiss this part of the subject, and proceed to discuss spinal injury, with impaired vision. The effects of concussion or shock may be either immediate or remote—that is, symptoms of mischief may quickly supervene, or remain latent and require no special attention or treatment for weeks or months after the receipt of injury. The suddenness of the shock probably produces only momentary unconsciousness; and unless evidence of a more convincing nature, as a bruise or cut, is forthcoming, the patient has no clear conception of when or how the blow was received—indeed, can give nothing like a lucid account

of the occurrence. Such injuries may be classed among those of general nervous shock or concussion, although this constitutes no reason for removing them from the more special injuries of the cord; and as a rule we shall do well to follow the sound advice given by Dr. Abercrombie, to look upon concussion of the cord as deserving of minute attention, and without loss of time employ active measures for preventing or removing inflammatory action.

It is unnecessary to dwell upon the possibility of danger, immediate or remote, which may follow the slightest shaking or wrench of the vertebral column; indeed, very many fatal cases have at the outset appeared to be of a very trifling nature. The following case is an apt illustration of this fact.

On the 21st of August, 1872, Mr. Jepson, of Blackburn, was travelling on the Lancashire and Yorkshire Railway by an excursion train, which came into violent collision with another train at Paulton. Mr. Jepson was very much bruised on the back, shoulder, and other parts of the body; his injuries were apparently not serious; vision was impaired, but he managed to attend to business. From that time until his death, in the March following, he got gradually worse, exhibiting all the symptoms of spinal concussion, great pain and tenderness down the spine, twitchings and startings of the limbs, shooting pains in the head, and gradually supervening paraplegia. The immediate cause of death, however, was an attack of pneumonia, against which he seemed wholly unable to bear up. The post-mortem examination revealed not only pneumonia, but considerable softening of portions of the spinal cord, an enlarged fatty liver, and a scrotal hernia. The jury were of opinion that the death of the deceased



was the result of the railway accident, and they returned a verdict of manslaughter against the engine-driver of the train. It is not often that spinal concussion has been made the subject of a coronor's inquiry, but in this instance there could be no reasonable doubt that death was due to the railway collision; nevertheless, the company resisted the widow's claim for compensation, but a jury awarded her substantial damages.

Another class of cases, differing much from that just narrated, in which many anomalous and puzzling symptoms arise, frequently come under observation. The patient from the first believes he is the victim of a very severe injury; he minutely describes pains and perverted sensations with a truthfulness perfectly consistent and quite convincing. After repeated careful examinations, we are unable to satisfy ourselves of the precise nature of the injury, and eventually come to the conclusion that no injury has been done to the spinal cord. In such cases remedies afford no relief, and the patient falls into a nervous state, and apparently suffers from some distressing illness; nevertheless it is evident that the constitutional disturbance is referable to disordered nervous action. Such cases should in my opinion be grouped together as cases of "hysterical spine." Mr. Erichsen, I gather, believes that the symptoms and condition spoken of are dependent upon spinal anæmia induced by the shock of the accident acting either directly on the cord itself, or indirectly, and at a later date, through the medium of the sympathetic system, in consequence of which the quality of the blood distributed to the cord becomes altered and diminished—the vessels become constricted. (a) This view

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(a) "Lectures on Concussion of the Spine," by J. E. Erichsen, F.R.C.S., &c.

is probably the right one, and it supplies an explanation of cases often regarded with some suspicion. It is important to bear this in mind before we draw unfavourable conclusions, for although we have to deal with symptoms differing much in their consequences to the injured, the foundation of a distressing form of illness is laid which can no more be shaken off than the sufferings which follow actual injury of the spinal cord.

The medical officer of the railway company in his examination of these cases believes he has to deal with sheer impostors. The objective symptoms certainly do not assist in the elucidation of the nature of the injury ; an ophthalmoscopic examination affords no evidence of a neuro-retinal change ; nevertheless it must be conceded that mental shock acts as an important element in the aggravation of symptoms, which an adverse and dogmatic practitioner will at once say arise from "railway dyspepsia."

The class of people who are most likely to suffer from "hysterical spine" are the travelling clerks of the post-office. This useful body of public servants, it will be remembered, are constantly journeying to and fro, and are daily—nay, hourly—exposed to the dangers of railway accidents. It is not unreasonable to believe that after two or three severe shakings, they will feel nervously susceptible of becoming victims of "railway spine." It is well known that a large number of post-office travelling clerks are early applicants for superannuation, and I am credibly informed that a still greater number are obliged to take long and frequent rests after railway injuries. I believe, however, in no single instance has a clerk been killed outright. Some of my cases will be seen to illustrate the effects of mental shock upon the general health.

A violent blow on the head and back is not immediately followed by symptoms of concussion of the spine, as is remarkably illustrated in the case of a railway clerk, who, while employed at his desk at the moment of a collision, was violently thrown down ; although stunned, he thought himself little injured, and continued at work without interruption for about three weeks, " being determined not to give in," as he said. In a few days he suffered from severe headache, nervousness, and sleeplessness ; was ultimately obliged to take to his bed, and was off duty for six months. Eventually he received £100 as compensation for the injury, and medical expenses, believing at the time he was imposing upon the Company ; however, in less than twelve months he died from meningitis. A post-mortem examination, made in the presence of the medical officer of the railway company, left no doubt on the mind of any one as to the cause of death.

How many of the travelling clerks of the post-office have ultimately and in a silent way fallen victims to collisions while in the execution of their duty it is impossible to say. All that I have been able to gather on this point is that a number of invalided men soon after they have been superannuated, leave old quarters, and are then quite lost sight of by the medical department of the post-office. Of this there can be no doubt, that if the long list of mutilated and killed were collected, the country would be astonished and horrified at the number of widows and orphans left desolate by railway collisions.

Railway injuries, I need scarcely say, differ in no important particular or symptom from those received in other ways. In my experience they are very frequently associated with impaired vision of a persistent and distressing character. An examination of the visual field in

all cases is, therefore, of considerable diagnostic value and importance.

Unfortunately, it is only in exceptional instances that the ophthalmic surgeon has the opportunity of watching the earliest indication of inflammatory action in the nervous tissues of the eye after concussion of the cord, and still more rarely can he compare the pathological changes which follow shock. Mr. Erichsen, with a much larger experience of spinal injuries, tells us he has never witnessed a post-mortem examination, and can, therefore, only offer secondary evidence of the morbid changes. Of the nature of the primary changes after concussion, I need hardly say very little is known. It is quite clear, however, that the symptoms, whatever they may be, in injuries to the spine, are not always due to morbid changes in the cord itself; variations both of a molecular and of a degenerative nature occur, inflammatory and anæmic, and it is an indisputable fact that myelitis and meningitis may coexist, while cerebral meningitis is not unfrequently associated with anæmia of the cord. (a)

For what information we possess of the morbid changes in the cord after spinal concussion we are indebted to Dr. Lockhart Clarke, and to him we look to clear up points of much interest in connection with the subject. So far as I have been able to make out, there are no grounds for supposing that any very material difference exists between the morbid changes produced by railway concussion or shock and impaired or degenerated nervous tissue following disease, locomotor ataxy for example.

Impaired vision arising from direct injury (injury to the fifth) received above or near the eye is of common

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(a) Erichsen, *op. cit.*

occurrence. A blow from the cork of a soda-water bottle will deprive a patient of sight. The *contre-coup* is often sufficient to inflict a good deal of mischief on the retina; in this way sight in an instant may be partially or wholly lost. A wrench or shock to the spine may lead to the same result. A violent blow inflicted on the forehead by the head coming in contact with the opposite side of the carriage, and impairment of vision quickly follows. In such a case inflammatory changes in the internal eye are observed with the ophthalmoscope, in a longer or shorter space of time after receipt of the blow: congestion of the retina, hyperæmia, or even capillary hæmorrhages, neuro-retinitis, insensibility of retina, amblyopia, slowly supervene. We know that a decided mechanical alteration in the conditions of a nerve, whether of the eye or other part, is often produced by twisting, stretching, or tearing, and in any of these ways nerve irritability is soon destroyed; that continued pressure of an increased quantity of blood circulating in the retina will be sufficient to occasion manifestations of sparks, flashes of fire, &c., in eyes morbidly excitable after railway concussion.

Mr. Wharton Jones is of opinion that impaired vision, or lost sensibility of the optic nervous apparatus, follows concussion of the spine or brain, in a longer or shorter time, in all cases. (a)

It has frequently been observed that blows inflicted about the cervical region or between the shoulders are productive of a greater amount of injury to vision than injuries inflicted below the last mentioned point, and that

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(a) "Failure of Sight from Railway and other Accidents."  
By T. Wharton Jones, F.R.S., &c.

the whole train of symptoms are due to the creeping upward of a meningitis, originally spinal, and ending in being cerebral (Dr. Long Fox).

Mr. Wharton Jones believes he is justified in deducing from experimental and pathological observation that the sympathetic nerve is largely or wholly concerned in the inflammatory changes in spinal concussion. I must take exception to this view, since there are cases on record in which complete paralysis of the cervical sympathetic existed, and in which no neuro-retinal disturbance was at any time observed. We know, also, that two kinds of neuro-retinal mischief accompany spinal injury, one congestive or inflammatory, the other atrophic or degenerative, and that both occur without concomitant evidence of palsy of the sympathetic. Section of the sympathetic seems to show that something more than mere active or passive dilation of the vessels is required to induce inflammation, and it has been noticed that an increased current of blood, augmented temperature, increased secretions, and acute sensibility, exist for some time after section of the sympathetic nerve, and without actual disease supervening therefrom.

In default of a series of autopsies, writes Dr. Allbutt, (a) we are led to conjecture that hyperæmia of the retina following injury of the spine does probably depend upon an extension of the meningeal irritation up to the base of the brain. We have reason also for supposing that such irritation or inflammation does creep up into the encephalon, for, setting aside the remarkable head symptoms such patients often present, physiologists have observed that encephalic meningitis is not an uncommon accompaniment of spinal meningitis.

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(a) "The Use of the Ophthalmoscope in Diseases of the Nervous System," page 206.

*Symptoms.*—The usual and more common sequence of symptoms of impaired vision from concussion of the spine are as follows :—Soon after the receipt of injury the patient finds he cannot read or write—the letters are blurred, portions of words are blotted out, or their position altered, spots float before him—*muscæ*, (a) or *scotomata* ; this last symptom, however, is very frequently an accompaniment of hypermetropia, want of power in the refractive media, —in such a case the power of accommodation for the time being only is lost, and glasses immediately afford relief—intolerance of light, over-sensitiveness, and, as the spinal mischief advances, a painful state of photophobia comes on, with neuralgic pains over the brow, and lachrymation. Other symptoms less frequently present are pericranial pain, objects appear displaced and unnaturally small, micropia, or coloured (*chropsia*), a symptom associated with the more serious forms of injury—diplopia of an exaggerated kind, amblyopia. &c.

The ophthalmoscopic appearances of the internal eye in cases of concussion vary exceedingly. The changes are limited to a small portion of the centre of the field of vision ; hæmorrhagic spots are scattered over the periphery of the disc, or about the retina. The veins are large and tortuous, the arteries pale, and almost lost to view. At another stage, or in another case, redness is more generally diffused, orange-red or a daffodil-colour prevails, and obscures the vessels, as well as the outline of the disc. Occasionally hyperæmia is followed by a swollen condition

(a) “ Mechanical irritation, as contusion or section of the trunk of the optic nerve, leads to lightning-like illumination of the whole field of vision. Pressure applied to the eye or to a limited part of the retina leads to circular bright figures, ‘ phosphenes,’ upon the corresponding side of the field of view.”

(œdema) of the papilla, or is associated with a chorio-retinitis ; but atrophy of the nerve is rarely seen as a consequence of spinal injury. As to the more general symptoms observed in spinal concussion, and in addition to those already specially indicated, patients complain of headache, or violent pains of the head, giddiness, sickness, confusion of thought, inability to concentrate attention, noises in the head, deafness, sleeplessness, lassitude, pains down the legs or spine, hyperæsthesia, or over-sensitiveness, formication, or numbness of the hands and limbs, derangement of the genito-urinary organs. Retention of urine produced by paralysis of the muscular walls of the bladder follows degeneration of the spinal cord. Temperature lowered one or two degrees, "a sign of considerable importance as diagnostic of the intensity of the shock" (Le Gros Clark) (a). Loss of motor power, paralysis, with changes of an inflammatory kind, supervene when the spine is jarred and the nervous system simultaneously agitated and deranged. The examination is not complete until the electric or Faradaic test has been applied. Some go so far as to say, if the patient's legs or arms move at all under the application of the galvanic current, he has not lost voluntary control, and therefore is not paralysed ; but if there is absence of reflex movement on tickling, with wasting of the limbs, we infer palsy, although it is no doubt a favourable sign if the patient can move his limbs in the slightest degree under the stimulation of galvanism. Meyer says that, except in cases in which the hysterical is united with peripheral paralysis, the electro-muscular contractility of the muscles, whose motions are not under

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(a) "Lectures on the Principles of Surgical Diagnosis," &c. By F. Le Gros Clark, F.R.C.S., &c. 1870.



the command of the will, is perfectly preserved, although their sensibility is lessened or entirely gone. When, then, paralysis follows concussion of the spine or cord, it is not peripheral, and we should look for electro-muscular contractility. At all events, the galvanic test is valuable, inasmuch as it enables us to ascertain the loss of power and rigidity of the muscles in the upper and lower extremities separately.

With regard to sight, it is noticed that, as in hemiplegia, very often one eye only is affected ; this may prove embarrassing, and assuredly demands care in determining the positive and comparative acuteness of vision in each eye, especially so in cases of suspected imposition. Some twelve years ago, and with the view of guarding against malingerers, I proposed and used the stereoscope in cases of simulated blindness. This instrument, it is well known, reverses or crosses the images of objects. I take advantage of this fact, and cut a word or paragraph, identical in size and character, into two parts, and having arranged it as a puzzle, present it to the patient as an ordinary stereoscopic slide. Anyone who reads equally well with both eyes will mix up portions of the word or paragraph into a confused reading, while one who has the sight only of one eye, has monocular vision, will read the word transmitted to the sound eye only correctly, and altogether miss or fail to give the rest. An endless variety of subjects can be employed for the correction of a false impression, as a red and green railway tunnel, a half-sovereign and a sixpence : no monocular patient will interpret rightly what can only be seen by the binocular. For the measurement of the acuteness of vision, observing rapidly the degrees of visual acuteness, beside the test types in more general use for measuring the range

of accommodation, perimeters, optometers, and photometers, are employed. Of the latter the handiest is the Lucigrade, or portable photometer of the late Sir Charles Wheatstone, expressly arranged for testing the acuteness of vision by Mr. Browning, the well-known optician. It consists of a prism of neutral tinted glass six inches in length, and corrected for refraction by means of a prism of crown glass of the same length and angle cemented to it. The tint of the prism is so graduated that a piece of white paper receiving and reflecting the light of the sky can just be seen through its thinnest end, while the thickest admits of sunlight being clearly defined. By a rack and pinion movement the graduated prism is made to move before the eye; while opposite the eye-piece is a tube with two stout cross-wires. When using the instrument to estimate the sensitiveness of vision, the tube should be directed towards a bright source of light (a lamp) and the thinnest end of the prism brought opposite to the eye-piece, the observer looking through the eye-piece at the cross-wires, the prism must be moved by means of the rack, so as to bring the thicker and darker portions of it between the eye and the wires. From this point the prism is gradually passed on until the image of the wires is just extinguished. The position of the prisms must then be read off and noted. Observations may be corrected by reversing the order of the experiment, beginning at the thickest portion of the prism, and the mean taken of the two readings.

This instrument, unlike the perimeter, involves neither loss of time nor patience, and will be found a ready method for ascertaining, monocularly, acuteness of vision.

From this digression I pass to the consideration of the pathology of the nerve lesion, which occupies a limited

space in the literature of spinal concussion. In only two or three cases have post-mortems been made. In the first a microscopical examination was made of the cord by Dr. Lockhart Clarke. The particulars are given in the "Transactions of the Pathological Society of London," 1866, vol. xvii., the case, which occurred in the practice of Mr. Gore, of Bath, was that of a gentleman, middle-aged, who had been in a railway collision, and after the occurrence was able to walk some distance home, being conscious of having received only a slight injury from a pain in his back. There was no external wound or bruise. Gradually nervous symptoms set in, and he became partially paralysed. If he was off his guard for a moment his cup or glass would slip from his fingers. There was no tenderness of spine, no convulsive movements, nor paralysis of the sphincters until within a few months before death, which occurred three years and a-half after the injury from chronic meningitis. The traces of chronic inflammation were seen in the arachnoid and cortical substance of the brain. The spinal meninges were congested, and exudative matter had been deposited on the surface of the cord, which was of a darkish-brown colour. Sections of the cord examined under the microscope presented a multitude of compound granular corpuscles and isolated granules, and an exuberance of wavy fibrous tissue which had replaced the obliterated nerve-fibre. The posterior horns, at their extremities, contained an abundance of isolated granules, and the anterior cornua were smaller than natural. A close resemblance was observed between the morbid condition of the cord and that of locomotor ataxy, where the degenerative changes are limited, with rare exceptions, to the lumbo-sacral region.

By the kindness of Dr. Lockhart Clarke, who placed

sections from the cord in my hands, I am enabled to give a magnified drawing of one, which, although an inferior specimen, shows well-marked advanced atrophy, and flattening in the antero-posterior diameter. The cord is generally wasted and shrunken; the white columns, the posterior, are more especially the seat of disease, being darker and more disorganised than the antero-lateral. The nerve-cells, ganglia, of the grey substance of the horns are also much shrunken, and the finer nerve-fibres degenerated. (a)

(a) DESCRIPTION OF COLOURED WOODCUT ILLUSTRATIONS WHICH FORM A FRONTISPIECE.

FIG. 1.

*Transverse Section of Healthy Spinal Cord.*

- AA'. Anterior lateral column of left side.
- BB'. Outer and inner portions of posterior columns.
- C. Gelatinous substance of posterior grey horn.
- D. Anterior grey substance of horn.
- E. Anterior median fissure.
- F. Commissure and central canal between lateral halves of grey substance.

FIG. 2.

*Transverse Section of Diseased Spinal Cord, where the changes were least conspicuous.*

*The letters and references same as in normal section, Fig. 1.*

*Transverse section from a railway injury.*—The cord is seen to be much flattened from before backwards. The anterior posterior flattening is due to atrophy of the posterior columns. The dark dots show numerous cut ends of the longitudinal nerve fibres, which are scanty in the intervening spaces between B and C, and have nearly disappeared in the inner division B' of the posterior columns. The lengthening and shrinking of the anterior median fissure is conspicuous; and the stellate cells of the posterior grey substance are atrophied and shrunken. The several parts are congested and greatly distorted.

A most interesting fact in connection with the case is the almost total absence of most of the characteristic symptoms of spinal concussion ; nevertheless, there could be no doubt death was due to chronic meningitis, and that the disease was the result of the railway collision. In my own cases, twelve in number, it will be noticed that death occurred in two, and that impairment of vision was a prominent and distressing symptom in every instance. In many of them it was at first contended that the spinal mischief arose from other causes, quite apart from the actual cause of injury, concussion of the cord, or shock.

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CASES OF INJURY TO NERVOUS SYSTEM,  
AND CONCUSSION OF CORD, FROM RAIL-  
WAY COLLISION, &c.

CASE II.—*Railway Collision—Injury to Nervous System—Rapid Development of Symptoms—Death in Four Years.*—Mr. I. J——, æt. 40, a town traveller, injured in a collision which occurred on the London, Brighton, and South Coast line, October, 1863. Mr. J—— was in a second-class carriage, with his back towards the engine, when he received a violent blow on the right side of the head. He was stunned for a moment ; the first indication of injury was a large abrasion over the right temple and the rupture of some superficial conjunctival vessels. Although he and his wife were much shaken, they made their way home. The next day he attempted to go to business, but finding himself unequal to it, he sent for

Dr. F. Jones, to whom he complained of headache, depression of spirits, pains down the spine, and numbness of the left arm and hand. His sight was dim, one eye in particular was slightly ecchymosed, he was unable to read, and he experienced a general sense of pain and discomfort. Three months elapsed, and the defect of vision was rather on the increase. I was then asked to see him. The pupils were contracted and sluggish; with the right eye he could only read No. 16 test types of Jäger, and with the left could make out only quite large objects; + 8 somewhat improved vision, but produced pain and lachrymation when used for more than a few minutes. The stereoscope afforded confirmatory evidence; examined with the ophthalmoscope, the discs were observed to be congested; about the periphery of the left numerous capillary hæmorrhages were seen. Iodide of potassium was given in full doses. At the end of six months, although his general health had improved, sight had in no way changed. This was an important matter, as Mr. J. could no longer drive about town, and he was eventually compelled to give up his employment. Subsequently he brought an action against the railway company and recovered damages, but not health. The symptoms of spinal concussion assumed a graver and more distressing form, and he died in about four years after the accident. I have been unable to obtain the particulars of his last illness, and no post-mortem was made.

CASE III.—*Railway Collision—Severe Wrench of Spine—Impairment of Vision of one Eye, probably from Paralysis of the Fifth—Partial Recovery.*—Mr. H. M——, a member of the medical profession, æt. 58, was in a railway collision on the 8th August, 1865, on the North-Eastern line. He and his wife were seated in the coupé of a first-class carriage,

which, on entering the station at the termination of the journey, came into violent collision. The shock was so great that Mr. M—— was thrown violently forward against the thick plate-glass in front, and his head went through it; he then fell backwards against the panelling of the carriage. His head and face were cut in several places, and he bled profusely; he was very much shaken, and for a few minutes quite stunned. On his return to consciousness a cloud appeared before him, his eyes flashed fire, and his head ached violently. His wife was, at the same time, much shaken, but less injured. They were ultimately removed from the station and driven home. Mr. M—— was soon after seen by the late Sir John Fife, as well as other eminent men of the town, and subsequently by several London men. By good treatment, change of air, and perfect rest he gradually improved in health, but the sight of the left eye, which had been seriously contused and injured, remained in the same state. His own opinion was that it had somewhat deteriorated. His practice had seriously fallen off, and now (1868), two years and upwards after the accident, he was unable to perform an operation or attend to his patients. It should be mentioned that he had, up to the time of the accident, been a good operating surgeon. I was not consulted until the December of 1867, just two years after the collision. Mr. M—— could then read only No. 20 of Jäger's test types with the left eye, and the right required a + 10 to read types which could be read by most men of his age without glasses. The pupil of the left eye was contracted, and only sluggishly dilated after the application of atropine; the fundus presented evidences of old capillary hæmorrhages—was of a daffodil colour; the arteries were small, and the veins tortuous, the retina of

the right eye hyperæmic, and a greyish-black ring surrounded the periphery of both discs. The stereoscopic test confirmed the patient's statement of almost total blindness of the left eye (monocular vision), and after a careful investigation I came to the conclusion that injury to the fifth and concussion of the spine had produced a permanent impairment of vision. I saw the patient on subsequent occasions in consultation with the late Mr. Skey, Mr. White Cooper, and others, and my opinion was confirmed by those gentlemen. The case was tried before Mr. Justice Lush; the present Lord Chief Justice Coleridge conducted the case. The loss of an eye was, indeed, no light matter for an operating surgeon, and one who had for several years been surgeon-in-chief of the infirmary of the town. The question was as to the positive and permanent injury and probability of recovery. Mr. M——'s enfeebled state, prostration, and nervous weakness seemed to lead us to an unfavourable prognosis. He had, it appeared, made one or two attempts to operate, and had signally failed, and was therefore obliged to retire from active professional duties. It was quite evident that, although able to be about, his health was seriously impaired. The condition of the patient at the present moment has not much improved, indeed, at one time his friends were afraid that he would share the fate of four other gentlemen who were injured in the same collision, and all of whom died from their injuries in the course of a few months, or in two or three years. I have, I regret to say, been unable to obtain particulars of these cases, with one exception, that of a master butcher of the town, who died in four months after the accident from what was said to be diabetes mellitus. It was remarked, however, that neither of the four appeared to be so much injured as



Mr. M——, and each accepted from the railway what barely paid the cost of medical attendance.

4 | CASE IV.—*Fall from Horse while on duty at Aldershot—Slight blow on Head—Rapid Development of Symptoms of Concussion—Perfect Recovery.*—Lieut. B——, æt. 36, Royal Engineers, was thrown from his horse while on duty, September 1st, 1865. He had a heavy fall, and was momentarily stunned. His face was slightly bruised and scratched, but he immediately recovered his feet, and was able to lead his horse to the stables. He dined as usual. Feeling somewhat unwell, he retired early from the mess-table. His sleep was much disturbed, and on the following morning he complained of pains in his head, sickness, &c., and was obliged to send for a medical friend. He was subsequently seen by Surgeon-Major Johnston, who ultimately placed him under my care. The symptom that at the time gave Mr. B. most annoyance was an exaggerated diplopia. With both eyes directed towards me he saw a confused second image standing over my head. On looking over his right shoulder objects appeared to be placed side by side, and somewhat overlapping each other; with one eye closed, vision was nearly normal, but he was unable to read, as dizziness ensued. There was no strabismus, no loss of memory; he could perfectly remember every incident of the accident. Leeches and purgation had removed some of the more urgent symptoms; the diplopia, however, was very distressing. The left pupil was slightly more dilated than the right, and a capillary extravasation covered a portion of the optic disc; the vessels were large and in a state of congestion; the fundus of the right eye | was somewhat obscured by a slight haze; the sight of this | eye was, however, nearly normal. He was ordered alterative doses of hyd. c. cretæ and quinine, with perfect rest. 4

On the 16th October, six weeks after the accident, the mercury was producing diarrhœa, and discontinued. Iodide of potassium was then substituted in full doses three times a day, and he left for the country.

Nov. 6th.—His health had much improved ; he could read No. 18 test types at six feet ; objects were no longer displaced ; able to read and write without fatigue for two or three hours together. It was upwards of a year, however, before all trace of the injury disappeared, and some eighteen months before he resumed duty.

CASE V.—*Railway Concussion—Injury of the Fifth—Much Impairment of Vision—Spinal Anæmia—Slow and Imperfect Recovery.*—Mr. R. A.—, æt. 38, in a railway collision, Dec. 6, 1870, North-Eastern line. At the time of the accident he was riding in the fourth carriage from the engine ; the coupling chain broke away from the three preceding carriages, which were smashed into pieces. He was reading a newspaper when the collision occurred, and was twice thrown violently backwards and forwards, his head striking against the paneling with considerable force, and rendering him for a moment unconscious of what was passing around. On recovery, his leg was bleeding, and he required assistance to alight from the train. He felt a good deal bruised on his return home. Next morning he complained of severe pain in his head, stiffness of joints, &c., and his wife sent for Mr. Maling, jun. The following day the symptoms increased, and he now noticed that his sight was dim, and flashes of light and showers of dense black specks gave him some alarm. Mr. Maling, on making an ophthalmoscopic examination, observed great congestion of the retinae. The left eye was more affected than the right ; the vessels were very irregular ; he could scarcely see large objects. Mr. Maling came to

the conclusion that the fifth nerve had been injured by the blow on the head, and that his patient was suffering from concussion of the spine.

On the 12th January he was seen by the medical officer of the railway company, who considered rest and change of air advisable.

On the 24th March he consulted me. His wife accompanied him, and told me "he was extremely irritable, nervous, and restless. She had never known him so easily put out about trifles." He complained of everything having a blue tinge, saw double, and could neither read nor write. He was desponding about his condition, and suffered much from headache. The numbness persisted down the right side, and the vision of the left eye was weaker than that of the right. He was unable to see the fair outline of objects. The discs were much congested, and peri-neuritis was diagnosed. It was suggested by the railway medical officer that the neuritis was the result of an old syphilitic taint; but as I saw no reason to coincide in this opinion, a further consultation was thought advisable, and on the 27th March Mr. Erichsen saw him, and wrote me to the following effect:—"Mr. A. appears to be suffering from cerebral irritation or disturbance—I hope not of a serious nature, but still sufficiently marked. I attach great importance to an ophthalmoscopic examination in the case, and the neuritis described by you appears to me to be referable to the accident, and not to previous disease." The company soon after decided upon making compensation without putting Mr. A. to the anxiety and annoyance of a trial. He made a slow recovery, and was ultimately obliged to give up business.

CASE VI.—*Railway Accident—Concussion of the Spine—Impaired Vision—Imperfect Recovery.*—Mr. J. H—,

æt. 45, a resident of Sunderland, in the collision of the 6th Dec., 1870, on the North-Eastern Railway. He was seated in a second-class carriage, the end of which was smashed in, and he was thrown with considerable violence forward. A momentary faintness came over him, and he found his nose bleeding. He soon, however, recovered, and was able to render assistance to his fellow-passengers. The excitement, he said, seemed to arouse him, and he thought lightly of his own mishap, and went home in the train sent to the assistance of the disabled. The next morning he felt some headache, but was not prevented from attending to business. A few days after he felt more seriously ill, and was for a period of eight weeks under medical treatment. He was then advised to try change of air. Vision was much impaired when he consulted me, and he complained of nervous headache, sleeplessness, and an inability to remember the names of customers and the occurrences of the day. He had lost weight considerably, had tingling sensations down his legs, arms, and fingers, and could not keep his books. His eyes were over-sensitive to light, and the loss of accommodation, hypermetropia, required + 26 to neutralise it. The ophthalmoscope showed congestion of the right and peri-neuritis of the left eye, the papilla being swollen, with exudation chiefly confined to the margin of the disc, the outline of which was much obscured. The vessels were varicose. The prognosis was an unfavourable one. I have since heard that the patient eventually became a confirmed invalid.

CASE VII.—*Railway Accident—Slowly-developed Symptoms of Concussion—Impaired Vision—Death from Diabetes.*—Mr. George M——, æt. 50, a carcass butcher, was in the Brockley Whinns collision on the Great Eastern

Railway, Dec. 6, 1870, on his way from Sunderland to Newcastle to attend the cattle market. Mr. M. was sitting with his back to the engine when he was suddenly thrown backwards and forwards. Believing he was not seriously injured, he proceeded to Newcastle, and attended the market. The next day, feeling slightly unwell, he consulted his usual medical attendant. In about two months symptoms of concussion presented themselves, and he was soon after seen by the medical officer of the railway, and by several local men of eminence.

On the 27th July following he came up to London to consult me ; at this time his vision was very much impaired. He complained of disturbed mental and sensorial functions, of tingling sensations down the legs, loss of power, great irritability of the bladder, cold perspirations, confusion of thought ; the conjunctivæ were congested, and lachrymation troublesome ; sight of left eye was weaker than the right ; could not read off words in the stereoscope. It was said that he was given to drink ; but this he strongly denied, and his statement was confirmed by a niece who accompanied him. The fundus of the left eye in particular was much congested, and of a deep dusky hue. The discs of both were much obscured by capillary congestion and interstitial inflammation. The arteries were consequently most indistinctly seen. Both eyes had suffered from choroïditiſ disseminata, the left more so than the right, and I was surprised to find he could read at all.

Nov. 27th.—I was now struck by his altered look ; his speech was slow ; he was moved to tears as I questioned him, and was evidently much worse than when I before saw him. The loss of power of accommodation was very marked ; he was unable to read without strong convex glasses. The late Mr. Skey, who saw him with me on

this occasion, described him "as the wreck of a man." The railway refused compensation, and he was obliged to bring an action in the Court of Queen's Bench. The medical officer of the railway appeared at the trial, and hazarded an opinion that the plaintiff was suffering from "railway dyspepsia," and "when the anxiety of the trial was over he would soon get well." This prediction was not verified, for in three or four months he died from meningeal disease, associated with diabetes. It was said that the diabetic condition was the actual cause of death. To this I reply that diabetes had not previously to the accident been either diagnosed, or even suspected; the disease must therefore have been what Bernard termed "traumatic diabetes," that is, due to a paralysis of the blood-vessels of the liver; in other words, to injury of the inferior cervical ganglion, vaso-motor supply of the liver, or the nerves which proceed from it to the ganglion stellatum, and which are known to occasion diabetes. The cause of death was the injury to the nervous system, and the diabetic condition materially hastened the fatal result.

CASE VIII.—*Railway Injury—Slow Development of Symptoms of Impaired Vision—Partial Recovery.*—Mr. J. B—, æt. 50, a miller, was with his daughter, æt. 20, in the collision at Brockley Whinns, December 6th, 1870. The carriage was smashed in which they were seated. Miss B. escaped with a fractured leg, and other severe bodily injuries, and it was scarcely possible that her sufferings could have been aggravated by "railway dyspepsia." Mr. B. received a few bruises and scratches, and was otherwise apparently uninjured. Symptoms of concussion were, however, gradually developed; his general health was seriously deteriorated, eyesight much impaired, and he could only read No. 19 of Jäger's test types. The

paralysis of accommodation, manifest hypermetropia, differed somewhat in the two eyes—that of the right required  $+18$ , that of the left  $+10$  for its relief. With spectacles so arranged,  $+18$  and  $+10$ , he could read for a short time, but a painful irritability to light restrained him. The hyperæmia of the retina of right and the inflammation of the optic nerve of the left, associated with photopsia, threatened degenerative changes in the nerve. Full doses of iodide of potassium and perfect rest were prescribed and continued for some months. A year and a half after the accident no great improvement had taken place, and the anxiety of law proceedings tended to increase his difficulties. Ultimately, Mr. J. B. was compelled to sell his business. I have since heard that his sight has not at all improved; he is never free from headache, and is a confirmed invalid.

CASE IX.—*Railway Collision—Spinal Injury, quickly followed by Symptoms of Paralysis and Impaired Vision.*—Mr. R. C.—, æt. 36, in collision on the Great Eastern line, November, 1876, was seated with his back to the engine, when the train was run into, and he received a severe blow on the back of his neck and head. For a short time he became insensible, was removed from the carriage, and received attention at the station. Immediately on his arrival home he was seen by Mr. Welford, who recognised the gravity of the symptoms. On the morning of the third day after the receipt of the injury paralysis of the left side was complete; the sphincters were partially paralysed; he was helpless and confined to bed. Dr. Donkin saw him in consultation, and under skilful treatment some improvement took place. When I saw Mr. R. C., March, 1872, nearly fifteen months after the accident, he still appeared to be in a

very enfeebled state of health. The paralysis was confirmed, and sight greatly impaired. Diplopia, photopsia, and a contracted field of vision rendered reading or writing out of the question ; indeed, he required a + 6 glass for the right to enable him to read large pica ; this power only very slightly improved the left ; things had a blurred and coloured appearance. An ophthalmoscopic examination satisfied me that the case was one of chronic neuritis, and that further degenerative changes would certainly follow—probably atrophy of the nerve, ending in blindness.

CASE X.—*Railway Injury—Rapid Development of Symptoms—Cataract—Retino-Choroiditis.*—Mrs. S., æt. 60, was riding in a second-class railway carriage on the North-Eastern line, March, 1871, when a collision occurred, and she was thrown with considerable force against the opposite side of the compartment. Mrs. S. was stunned, shaken, and her forehead much bruised ; became hysterical, and out of health, and remained under medical treatment for some weeks. Up to the time of the accident Mrs. S. had been a good business woman, had successfully conducted for some years a pawnbroker's shop, but was now quite incapacitated, indeed, could not see to read, and barely write her name, and could no longer conduct her business. In March, 1872, I was requested to see her in consultation with Mr. Welford, of Sunderland ; she required at this time assistance to get about ; the left eye was cataractous, sight was totally obscured ; in the right large quantities of pigment were seen fixed and moving, retino-choroiditis threatened total blindness. Mr. Welford, who had attended Mrs. S. for some years, had not noticed cataract ; on the contrary, he always believed she had good sight, for she had not required glasses. I

C



attributed her loss of sight to the blow on the forehead, which affected the nutrition of the eye, was in fact the cause of the pigmentary retinitis through implication and irritation of the fifth nerve.

Mr. Welford lately furnished me with further particulars of Mrs. S.'s recent state. It appears that when at church one Sunday evening in September last, she was seized with sudden blindness of the right eye. Although feeling poorly and fatigued she insisted upon going to church, where she suddenly saw "a black-pall fall down before her eye." The next morning she could not tell whether it was day or night. The pupil was much contracted. Iodide of potassium in 5-gr. doses, and tincture of belladonna 5 drops three times a day was continued for a month, when sight began gradually to return, for she saw the hour by the clock, and could distinguish coin, a sovereign from a shilling.

CASE XI.—*Railway Injury producing Anæmia of the Cord—Hysterical Spine—Partial Recovery.*—Mr. W. H. M., æt. 38, a post-office travelling clerk, in a collision, June 28, 1871, between Derby and Newcastle. He was at the moment occupied at his desk, when he was thrown forwards and backwards, falling flat on his back. He soon recovered his feet, and although shaken, was able to proceed on his journey. It was not until after his return journey to Derby he discovered that his back was much hurt; he was passing a large quantity of pale-coloured urine, and his bowels were confined; had suffered from piles. Mr. Fowles, his ordinary medical attendant, made a careful examination of his person, and found several bruises about the lumbar region. He then complained of headache, giddiness, loss of sight, and palpitation of the heart, which

confined him to his room for three or four weeks, when he was seen by the medical officer of the railway company and also by Dr. Waller Lewis, who recommended rest, sea air, &c. No change occurred, however, in his symptoms; he was frequently subject to violent attacks of palpitation of the heart, and was very hysterical. Dr. Lewis again saw him in consultation, and reported him unfit for duty.

His impaired vision had caused both himself and wife considerable anxiety, and on the 19th of August he consulted me. I learnt that three years previously he had been an unfortunate victim in an accident near the Camden Town Station, and since then had suffered from almost constant headache and sleeplessness. He was often unable to control his movements, and had therefore been obliged to constantly resort to narcotics. Manifest hypermetropia was present in his case, and he required + 36 glasses to neutralise it; even then he was unable to read for more than a few minutes without fatigue. This power was increased to + 18, and about the same time hyperæmia of the retina was observed. He now appeared to be suffering from considerable functional disturbance, was extremely hysterical, and indulged in fits of crying. The impairment of vision I thought in some measure due to the hysterical symptoms, and ventured to predict his ultimate recovery. On inquiry a few weeks since, and nearly five years after the accident, I was informed that Mr. M.'s hysterical condition much affected his general health, and that during the year 1871 he was off duty, on sick leave, 139 days. In 1872 he was in another slight accident on the Midland Railway, and was off duty 186 days. In 1873 he was off duty 52 days; in 1874 he was

only away during the usual official holiday ; and in 1875 was away on sick leave for 74 days. I look upon his case as a good example of hysterical spine.

CASE XII.—*Tramway Accident—no Direct Injury to Head or Spine—Gradual Development of Symptoms—Palsy and Anæsthesia on one Side; Hyperæsthesia of the other—Slow Recovery.*—Mr. W. B——, æt. 34, on the evening of the 16th of January, 1874, was on his way to an evening party when the brougham in which he was riding was caught by a tram-car, and turned over. Mr. B. was riding with his back to the horse, his two sisters sitting opposite to him, when extricated he was lying under them. They were all taken out through the window, and as the accident occurred close to the friend's house they received immediate attention. After a short interval of rest Mr. B. felt able to join in the dance, which was kept up until three in the morning. He returned home, and although feeling a little bruised and sore, he went off as usual to business. In the course of the afternoon, and about eighteen hours after the accident, he felt ill, pains in his limbs, numbness in the right hand, and a feeling of nausea. On the following day, the 19th, these symptoms increased, and in addition he experienced difficulty in swallowing, with severe pains about the lower cervical and upper dorsal regions. The right hand became paralysed and anæsthetic, while the left was hyperæsthetic. He felt every breath of cold air, even moving the bed-clothes produced a shudder—"a feeling as if scalded ice was touching him." On the 20th he lost power over the right leg, and the palsy appeared to be gradually creeping over him ; the sphincters were unaffected. His condition at the end of a week was pitiable and alarming in the ex-

treme, and I was requested to see him in consultation with the family attendant Mr. Llewellyn.

I found Mr. B. lying in a perfectly supine position, breathing hurriedly, and scarcely able to reply to my questions ; he was very hysterical, sobbed when I asked him to give me his hand to feel his pulse, for he was conscious of being unable to raise it. He answered with considerable hesitation, and spoke in a low feeble voice. The temperature of the two extremities differed as much as two and two and a-half degrees, that of the right being  $90^{\circ}$ , and the left  $92\frac{1}{2}^{\circ}$ . He complained of great pain in the head, and which extended down to the shoulders ; his head required to be supported on either side by pillows ; hearing on the right side was much duller than on the left, indeed, the loss of sensation on this side was very marked. Full doses of morphia were required to allay pain and secure sleep.

On my attempting to examine the eyes with the ophthalmoscope the ray of light from a candle produced lachrymation, photophobia was intense, and I was obliged to desist. There was no paralysis of the sphincters ; his brain was bright and clear, and he pressed me to tell him whether I considered him in much danger. I insisted upon perfect rest, ordered nourishment and stimulants to be constantly administered, and prescribed full doses of iodide of potassium.

Ten days afterwards I again saw him, and heard that Dr. Moxom had in the interval been called in, and concurred in the treatment. He was now slightly better, could, with some effort, move his right foot ; there was less lachrymation and intolerance of light, and I was able to examine the internal eye. The disc and fundus of the

right was much inflamed, and on the outer peripheral margin several capillary hæmorrhages were seen. The fundus of the left seemed to be obscured by some opacity, probably of the vitreous, inflammation of the vitreous body. The light, however, much distressed him, and I was obliged to desist ; vision was certainly not so good in this eye.

Ten days elapsed before I saw him again, when he was more cheerful ; could move his right leg and hand ; the tenderness about the cervical region had much subsided ; sleep was more natural ; the removal of the bed-clothes no longer gave annoyance. Bowels a good deal constipated, doubtless from the quantity of morphia administered ; on the whole satisfactorily progressing.

Ten weeks after the receipt of injury I again saw him ; he was then lying on a sofa near the fire ; could bear removal daily from bed ; the extremities were fast recovering sensation, and he was able to raise his right hand and arm ; hearing was improving, and he could rotate his head without causing pain ; was quite unable to sleep without morphia.

In May he was sufficiently recovered to be removed to the sea-side ; the following November he called upon me. Although his movements were slow, and the dragging of his right leg and foot quite marked, and the tingling sensation of his right hand fingers continued to trouble him, he was looking much better, and had gained flesh. His sight had in the meantime much improved, he could read without glasses ; the fundus of the left eye presented a nearly normal appearance. I now learnt that the tram company refused compensation, and that in July he had been visited by two medical gentlemen on behalf of the

company, when the electric test was vigorously applied to determine the irritability of the muscles of the extremities, but, said Mr. B., "the doctors expressed themselves satisfied that his case was a perfectly honest one." They were satisfied probably that the lesion had been meningeal.

On the 20th of January, 1875, rather more than a year after the accident, and in anticipation of judicial proceedings, Mr. Erichsen, Dr. Moxom, and myself saw Mr. B. in consultation. He was, as I have before said, much improved in health. The right arm, hand, leg, and foot were partially paralysed, and some contraction existed about the muscles of the shoulder-joint and leg. On coming downstairs he was obliged to hold firmly by the balustrade and descend step by step; he could not undress without assistance, nor write freely, so that his business aptitude was considerably impaired; was unable to work more than a few hours daily. His eyes remained irritable under a strong light, and produced a contracted state of the brow; the pulse was feeble and compressible, and he suffered from constipation. As the condition of the patient appeared to be almost stationary, the question we were called upon to decide was, "Will the patient completely and entirely recover, so as to be in the same state of health that he enjoyed before the accident?" The progress already made, although demanding a guarded prognosis, seemed to warrant the conclusion that he would in time lose all traces of the injury.

The defence took an unexpected and somewhat remarkable turn. The medical witnesses for the tram company, who, be it remembered, only saw the patient at a distant period of time after the accident, and when he was fairly on the road to recovery, ventured to affirm that the para-

lysis originated in *syphilis*. The grounds for this extraordinary opinion were that Mr. B. had confessed to some youthful indiscretion, had, some fifteen years before, been treated for a gonorrhœa, and it was assumed and alleged that at this time he must have suffered from syphilitic iritis, which had damaged his eyesight. The fact of the patient having since then become the father of five or six healthy children seemed to have no weight with those who originated this remarkable opinion, and which I am glad to say was rejected and discredited by judge and jury.

On the 22nd of October, 1875, Mr. B. again called on me. I found him in the same state of health as when we saw him in consultation. He had then, he said, just returned from Hastings, where he had been staying for a month. The right leg and foot he drags in walking, and suffers from tingling and cramp of the fingers of the right hand; there is also a peculiar appearance of arrested growth of the finger-nails; this attracted attention at the trial, and was said to be indicative of a syphilitic taint; and, what is still more remarkable, he has lost all sexual desire and power.

The case, as Mr. Erichsen observed, possessed points of interest, and was one not likely to be mistaken for syphilitic paralysis by those who had watched it from the outset. The interest of the case consisted in—1, That the paralysis and spinal symptoms did not begin to show themselves for nearly twenty-four hours after the accident; 2, That there had been no blow or direct injury to the spine; 3, That the symptoms were clearly explicable by Brown-Séquard's experiments on section of the cord; and lastly, the contraction of some of the muscles and the absence of palsy

of the sphincters indicating that the lesion was in all probability meningeal.

I have but little to add on the treatment to be adopted in cases of concussion of the cord or shock to what I have indicated in the narration of the several cases. The value and importance of rest, however, cannot be over-estimated ; rest combined with good nursing, good nourishment, and a judicious use of stimulants, with iodide of potassium and bromide of ammonium in increasing doses. To allay local pain, hot fomentations with belladonna, or a few leeches. For the hysterical condition, hysterical spine, which, as a consequence of shock, generally produces an aggravation of symptoms, soothing means and remedies, the bromide of ammonium, belladonna, strychnia, &c. To procure sleep, morphia, chloral hydrate, &c.

With active business men enforced rest often produces mental depression, the hypochondriacal or hysterical state. This, I need scarcely say, retards convalescence, and requires tonics, change of air, and society. In spinal anæmia, the atrophic form of spinal disease, the cold douche, or cold bath, with steel, quinine, phosphorus, and other tonics should be tried. For the removal of local paralysis, the galvanic current is an excellent remedy. Under the best directed and most skilful treatment recovery is often long delayed, or the patient may become the victim of some acute form of disease, and after a few years of protracted misery sink exhausted.

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